A STUDY OF GRADE PLACEMENT OF TOPICS IN ELEMENTARY SCHOOL ARITHMETIC

HAROLD MITCHELL THOMPSON

Digitized by the Internet Archive
in 2011 with funding from
LYRASIS Members and Sloan Foundation

http://www.archive.org/details/studyofgradeplac00thom

Manuscript Thesis

Unpublished theses submitted for the Master's degrees are deposited in the Florida Southern College Library and are available for inspection. Use of any thesis is limited by the rights of the author. Bibliographical references may be noted, but passages may not be copied unless the author has given permission. Credit must be given in subsequent written or published work.

A library which borrows this thesis for use by its clientele is expected to make sure that the borrower is aware of the restrictions stated above.

Florida Southern College Library

A STUDY OF GRADE PLACEMENT OF TOPICS IN ELEMENTARY SCHOOL ARITHMETIC

A Thesis
Presented to
the Faculty of the School of Education
Florida Southern College

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts in Education

by
Harold Mitchell Thompson
August 1949

Approval

S. T. Lastinger

S. T. Lastinger, Advisor

Readers

Date submitted

ACKNOWLEDGEMENT

The writer wishes to acknowledge his indebtedness to Professor Samuel T. Lastinger for his patience and his assistance in directing this study and to Dr. J. C. Peel for his suggestions and help in the selection of a subject for this thesis.

TABLE OF CONTENTS

CHAPTER PAGE

I. THE PROBLEM 1

The Problem 1

Statement of the Problem 1

Delimitation 1

Incidence of the Problem 2

Importance of the Study 2

Basic Assumptions 3

Organization of Remainder of the Thesis . . 8

II. RECOMMENDED TOPICS IN MATHEMATICS

FOR GRADE ONE 9

General Aim for Grade One 9

Specific Objectives for Grade One 9

The Work of Grade One 11

Sources of Reference 13

III. RECOMMENDED TOPICS IN MATHEMATICS

FOR GRADE TWO 18

General Aims for Grade Two 18

Specific Objectives for Grade Two 18

The Work of Grade Two 19

Sources of Reference 22

IV. RECOMMENDED TOPICS IN MATHEMATICS

FOR GRADE THREE 28

CHAPTER PAGE

General Aims for Grade Three 28

Specific Objectives for Grade Three 28

The Work of Grade Three 29

Arithmetic Vocabulary for the Primary Level 31

Sources of Reference 33

V. RECOMMENDED TOPICS IN MATHEMATICS FOR GRADE FOUR 40

General Aims for Grade Four 40

Specific Objectives for Grade Four 40

The Work of Grade Four 41

Sources of Reference 43

VI. RECOMMENDED TOPICS IN MATHEMATICS FOR GRADE FIVE 50

General Aims for Grade Five 50

Specific Objectives for Grade Five 50

The Work of Grade Five 51

Sources of References 53

VII. RECOMMENDED TOPICS IN MATHEMATICS FOR GRADE SIX 59

General Aims for Grade Six 59

Specific Objectives for Grade Six 59

The Work of Grade Six 60

Sources of Reference 63

CHAPTER PAGE
VIII. SUMMARY 70
Analysis of the Florida State Course of Study 70
BIBLIOGRAPHY 77
APPENDIX 86

LIST OF TABLES

TABLE PAGE

I. Analyses of Ten Textbooks and Courses of Study for Grade One 15

II. Analyses of Ten Textbooks and Courses of Study for Grade Two 24

III. Analyses of Ten Textbooks and Courses of Study for Grade Three 35

IV. Analyses of Ten Textbooks and Courses of Study for Grade Four 45

V. Analyses of Ten Textbooks and Courses of Study for Grade Five 55

VI. Analyses of Ten Textbooks and Courses of Study for Grade Six 65

CHAPTER I

THE PROBLEM

For a number of years the lack of uniformity in grade placement of topics in the elementary school program of mathematics has been a subject of much discussion by educators, and to date investigative or experimental evidence has not been sufficient to warrant any assumption that the entire solution of the problem is immediate.

I. THE PROBLEM

Statement of the problem. It is the purpose of this study to prepare a recommended sequence of topics in elementary school arithmetic, after having ascertained the grade placement of topics in elementary school arithmetic as recommended by a number of educators and authors of textbooks. The proposed sequence of topics in this study is to be based upon the conclusions drawn from an examination and an analysis of textbooks, workbooks, courses of study in elementary school mathematics, and the conclusions of a number of educators and psychologists.

Delimitation. It is the writer's purpose to limit this study to no less than ten textbooks or courses of study

for each grade on the elementary school level and to include an evaluation of the Florida State course of study in arithmetic for the elementary grades.

Incidence of the problem. The study was suggested by Dr. J. C. Peel because of existing discrepancies in textbooks regarding the grade placement of topics in elementary school mathematics. The writer expects to employ the knowledge gained from this study in an effort to improve the teaching of arithmetic in his own school.

Importance of the study.

> In the past hundred years in American schools, arithmetic has become a formal school subject, taught by means of graded textbooks, following an established sequence of topics that are recognized as essential to basic skill in arithmetic.
>
> The subject in the average school has consumed as much as one fourth to one third of the school day and most of the homework hours. Arithmetic has attained a position of such eminence among the school subjects that it constitutes one of the chief criteria of academic success.[1]

As a result of the increasing importance which arithmetic has assumed in modern life, there naturally arises

---

1. Hildreth, Gertrude, Learning the Three R's. Second edition. 1946. p. 706.

the question of what to teach and when to teach it; therefore, the problem of grade placement of topics in elementary school arithmetic is significant.

Basic assumptions. The curriculum worker who seeks a method of arranging specific topics for mastery on certain grade levels finds himself confronted with a number of factors influencing his choice. There is the constant problem of individual differences. Children vary widely in their achievement and in their capacity to learn, in their individual abilities, and in the degree of maturity essential for participation in certain activities. Hence, any grade placement of topics, to prove most effective, must be flexible to provide for individual differences.[2]

Present research indicates clearly that in most schools the arithmetical processes are being introduced too early. Relative to this problem the Florida State Department of Education advises:

> Teachers who have already worked with the problem of adjusting the placement of arithmetic processes and topics to the most desirable level have come to the general conclusion that in current practice these

---

[2] Caswell, Hollis L., and Doak S. Campbell, Curriculum Development, 1946. p. 329.

> processes are presented too soon and that their introduction should be delayed from a half to a whole year. Children are being asked to learn with great effort and limited success in one grade what they could learn economically a year later in the next grade. . . For example, this would mean that percentage now taught in the sixth grade would be more economically cared for in the seventh. Completion of the formal processes of addition, subtraction, multiplication, and division of fractions now taught in the fifth could be better accomplished in the sixth. The mastery of long division beyond the simple one-digit divisors could be attained in the fifth instead of in the fourth. The multiplication and division facts beyond 2's, 3's, and 5's now attempted in the third grade could be better learned in the fourth. The work of the first two grades might well be devoted to the gaining of number meaning from direct experience.[3]

The question of grade readiness is significant. Koenker points out that a number of authorities hold that primary children are too immature to benefit socially or mentally from more than a few number experiences which they encounter. These authorities further maintain that arithmetic readiness activities are unnecessary and that arithmetic instruction should be delayed until grade three or later; however, there are many educators who hold opposing convictions on this matter.[4] Koenker says that:

Other educators and psychologists are of the opinion that

---

[3] Bulletin No. 9, Florida State Department of Education, A Guide to Improved Practice in Florida Elementary Schools, 1940. pp. 212 - 214.

[4] Koenker, Robert H., "Arithmetic Readiness at Kindergarten Level," *Journal of Educational Research*, 42:218, November, 1948.

> primary children should be given a systematic and meaningful arithmetic readiness program with meaningful arithmetic instruction being introduced at the second grade level. They hold that most children are socially and mentally ready for arithmetic when they start school and postponement till grade three is not educationally sound. They further point out that young children exhibit a profound interest, knowledge, and enthusiasm for numbers which must be taken into consideration.[5]

Whatever the theories held regarding grade placement of topics or whatever opinions may prevail in the matter of a stepped-up program, most authoritative evidence as gathered from an examination of more than ninety textbooks and courses of study points to a program providing for a wide range of social experiences calling for a meaningful manipulation of numbers. The practice of delaying the arithmetical processes until the child is more mature does not in itself appear to solve that problem.

The modern arithmetic program provides for the social phase as well as the mathematical phase. The most commonly recognized goal for teaching arithmetic has been the mastery of facts and skills while the social significance of arithmetic has been neglected. An analysis of numerous courses of study in elementary school mathematics reveals the trend

---

5. Koenker, op. cit., p. 218.

toward greater emphasis on the social aspects of arithmetic. Relative to this Brueckner[6] says:

> "The value of facts and skills in arithmetic cannot be denied, but the possession of these without the ability to use them in the quantitative situations which life offers is evidence that the school is not meeting the needs of those whom it seeks to educate."[7]

The problem of grade placement of topics in elementary school arithmetic becomes increasingly significant if the school is to develop those understandings and skills which are necessary to enable the child to meet successfully those number situations which life ordinarily presents. From the Florida State Department of Education comes this observation regarding modern trends in the arithmetic program for elementary schools:

> A great amount of research has been carried on to determine what are those understandings and skills which should be developed in school. Two general trends are clear: first, that many concepts in arithmetic are complex and need to be developed gradually over a period of time if they are to be really understood; second, that successful learning of processes in later grades and speed and skill in using the processes in later grades have their beginnings in broad, first-hand number experiences in the early grades.[8]

---

6. Brueckner, Leo J., and Others, The Changing Elementary School, Report of the Regents' Inquiry, 1939. pp. 328 - 329.

7. Ibid., p. 230.

8. Bulletin No. 46, Florida State Department of Education, A Guide to Teaching in the Primary Grades, 1944.

According to Hildreth[9] the modern arithmetic curriculum provides for a series of experiences, arranged in sequential order, which will provide children with basic number concepts and establish correct habits in dealing with number processes. This series of number experiences would parallel the child's own experiences in everyday living and his natural development in the acquisition of facts and principles. Furthermore, Hildreth is convinced that the treatment of arithmetic as an organized, integrated system of facts to be learned in a sequential order, with the advantages of natural associations, simplifies teaching and economizes learning effort.

Many topics of remote significance such as cube root, complicated problems in denominate numbers, and commercial discount have disappeared from the curriculum of the elementary school. Some topics, such as fractions, have been given greater range in the arithmetic course so that the natural experiences of children will contribute to the development of concepts, according to Campbell[10] who concludes,

"Therefore, one of the newer trends is an earlier

---

9. Hildreth, op. cit. p. 758.

10. Campbell, Harold G., F. Lynwood Wren, Worth J. Osburn, and Joseph H. Randall, Guide for Teachers, 1947. p. 1.

> introduction of the fraction, and by the time the child has reached the fifth grade, several fractional concepts are already significant to him and the development of fraction processes which begin in this grade is made more meaningful."[11]

II. ORGANIZATION OF REMAINDER OF STUDY

Keeping in mind the foregoing trends as expressed by numerous authorities, the writer submits in the later chapters of this thesis a recommended sequence of topics in elementary school arithmetic. However, a later study in this field may change the sequence of recommended topics as educators and psychologists are still experimenting in this area.

The second chapter deals with the program for the first grade; the third, fourth, fifth, sixth, and seventh chapters deal with the grade placement of topics for the second, third, fourth, fifth, and sixth grades, respectively, The eighth and last chapter presents an evaluation of the Florida State course of study as compared to other courses analyzed in this research.

---

[11] Campbell, op. cit. p. 1.

CHAPTER II

RECOMMENDED TOPICS IN METHEMATICS FOR GRADE ONE

Selection of topics for each grade on the elementary school level was made on the basis of frequency as shown on the tables accompanying this and the succeeding chapters of this study. Those topics recommended by fifty to one hundred per cent of the textbooks and state courses of study examined were given preference in the grade placement of topics. Other topics shown in the tabulated data for each grade were omitted from the recommended grade placement of topics in instances where less than fifty per cent of the authorities favored their inclusion as shown in the tables for the respective grades.

GRADE ONE

A. General Aim

To enable the child to recognize and to solve number problems involved in the daily experiences of a child on the first grade level

B. Specific Objectives

1. To foster growth in attitudes and abilities by means of many selected, concrete work and play

experiences involving number wherein the pupil may discover interests and needs which he desires to satisfy

2. To develop number consciousness by directing pupil's attention to many uses of numbers in their homes and in their lives at school
3. To count, to read, and to write numbers from 1 to 10 inclusive, and beyond when the need arises
4. To count by rote to 100 by 1's and by 2's to 20
5. To learn ordinals first to third
6. To master the basic addition and subtraction facts from 1 to 10 inclusive
7. To apply this knowledge of number combinations with ease in the solution of many problems of interest to the pupils
8. To understand the clock and United States money - the cent, the nickel, and the dime
9. To recognize groups of 2, 3, 4, and 5 objects without counting
10. To recognize and to use in life situations the fractional idea 1/2 when applied to an object or to a small even group

C. The Work of Grade One

1. Counting abilities
    - a. To count from 1 to 10 and beyond as needed
    - b. To count groups by 2's to 20
    - c. To count by rote to 100 by 1's
2. Reading abilities
    - a. To read numbers and their word equivalents from 1 to 10
    - b. To read such denominations of money as the cent, the nickel, and the dime
    - c. To read simple problems involving number concepts on the grade level
3. Writing abilities
    - a. To write numbers correctly from 0 to 9
    - b. To write word equivalents of numbers from 1 to 10
4. Developing number concepts
    - a. By recognizing the number of objects in a group of 2, 3, 4, or 5
    - b. By finding groups containing similar numbers through the use of pictures or objects
    - c. By distinguishing between groups of varying numbers
    - d. By reproducing a group of a given number of objects
5. Learning addition by putting things or numbers together

    a. Confining addition to sums of less than 10
    b. Making addition automatic thus discouraging counting to obtain sums
        (1) By systematic meaningful drill involving number combinations from 1 to 10
        (2) By addition of concrete numbers

6. Learning the meaning of subtraction
    a. By the use of concrete examples involving numbers in the minuend no greater than 9
    b. By constant meaningful drill in these number concepts
7. Understanding the fractional idea 1/2
    a. By demonstrations with concrete examples
    b. By sharing objects equally with reference to small even groups
8. Becoming familiar with units of measure
    a. The clock
        (1) By recognizing number of hours on the face
        (2) By relating hours to daily activity
    b. United States money
        (1) By using the cent, the nickel, and the dime in transactions on the grade level
    c. The ruler
        (1) By learning the number of inches in a foot
        (2) By learning to measure objects

It is not expected that every pupil will master all the goals in the foregoing outline. It may be expedient to postpone some of them until certain pupils have achieved a more advanced level of maturity.

The course of study recommended for Grade One was derived from the following sources:

Brueckner, Leo J., and Elda L. Merton, *Our Numberland*. Philadelphia: The John C. Winston Company, 1948.

Bulletin No. 26, Florida State Department of Education, Arithmetic in the Elementary School. Tallahassee: 1942.

Bulletin No. 46, Florida State Department of Education, *A Guide to Teaching in the Primary Grades*. Tallahassee: 1944.

Bulletin No. 1120, University of the State of New York, Mathematics for Elementary Schools, A Handbook for Teachers. Albany: 1948.

Circular Series No. 32, *Illinois Curriculum and Course of Study for Elementary Schools*, 1943.

Clark, John R., Arthur S. Otis, and Caroline Hatton Clark, *My First Number Book*, Young America Series. New York: World Book Company, 1945.

Riess, Anita, Maurice L. Hartung, and Catherine Mahoney, *Numbers We See*. Atlanta: Scott, Foresman and Company, 1942.

Saunders, Agnes L., Helen Schmidt, and Wayman J. Williams, *Numbers for Beginners*. New York: Laidlaw Brothers, Publishers, 1948.

School Document No. 4, Boston Public Schools, *Course of Study for the Elementary Schools*.Grade One. City of Boston Printing Department, 1936.

Stretch, Lorena B., Pauline D. Burnitt, and Grace Melear, *My Own Number Book*. Atlanta: The Economy Company,1948.

Studebaker, J. W., W. C. Findley, and F. B. Knight, Number Stories. Atlanta: Scott, Foresman and Company, 1947.

Weber, Rose, and Ruth Weber, Growing Up With Numbers. Atlanta: The McCormick-Mathers Publishing Company, 1942.

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE ONE	Boston Course of Study	Florida Course of Study	Growing Up With Numbers	Illinois Course of Study	My First Number Book	My Own Number Book	Numbers For Beginners	Number Stories	Numbers We See	Our Numberland	Frequency of Topic	Total Number of References
1. Counting from 1 to 10	x	x	x	x	x	x	x	x	x	x	10	10
2. Reading numbers from 1 to 10	x	x	x	x	x	x	x	x	x	x	10	10
3. Writing numbers from 1 to 10	x	x	x	x	x	x	x	x	x	x	10	10
4. Recognizing coins 1¢, 5¢, 10¢	x	x	x	x	x	x	x	x	x	x	10	10
5. Recognizing groups of 2's, 3's, 4's, 5's	x	x	x	x	x	x	x	x	x	x	10	10
6. Counting to 100	x	x	x	x		x	x	x	x	x	9	10
7. Counting by 2's to 20	x	x	x	x		x	x			x	7	10
8. Addition facts to 5	x	x	x	x	x	x				x	7	10
9. Subtraction facts to 5	x	x	x	x	x	x				x	7	10
10. Addition facts to 10	x	x	x	x	x	x					6	10

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE ONE	Boston Course of Study	Florida Course of Study	Growing Up With Numbers	Illinois Course of Study	My First Number Book	My Own Number Book	Numbers For Beginners	Number Stories	Numbers We See	Our Numberland	Frequency of Topic	Total Number of References
11. Subtraction facts to 10	x	x	x	x	x	x					6	10
12. Ordinals 1 to 3		x	x	x			x	x		x	6	10
13. Telling time by the hour	x	x		x	x		x			x	6	10
14. Fraction $\frac{1}{2}$	x	x	x	x						x	5	10
15. Ordinals 1 to 5		x	x	x				x			4	10
16. Liquid measure quart, pint		x		x	x					x	4	10
17. Linear measure inch, foot, yard		x		x	x					x	4	10
18. Emphasis on number vocabulary	x						x	x		x	4	10
19. One-Step problems	x			x						x	3	10
20. Fraction $\frac{1}{4}$		x		x						x	3	10

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE ONE	Boston Course of Study	Florida Course of Study	Growing Up With Numbers	Illinois Course of Study	My First Number Book	My Own Number Book	Numbers For Beginners	Number Stories	Numbers We See	Our Numberland	Frequency of Topic	Total Number of References
21. Calendar	x	x								x	3	10
22. Ordinals 1 to 10		x		x							2	10
23. Fraction 1/3		x								x	2	10
24. Thermometer		x								x	2	10
25. Fractional measures 1/2 cup, 1/4 cup, 1/3 cup, 1/4 lb.		x								x	2	10
26. Simple geometric figures				x						x	2	10
27. Place value of units and tens									x	x	2	10
28. Recognizing U. S. currency $1, $5 bills		x									1	10
29. Reading and writing numbers from 1 to 100						x					1	10
30. Ordinals from 1 to 31		x									1	10

CHAPTER III

RECOMMENDED TOPICS IN MATHEMATICS FOR GRADE TWO

The following placement of topics for Grade Two was selected on the basis of the frequency with which these topics appeared in the analyses of the ten references selected for this grade.

GRADE TWO

A. General Aim

To enable the child to recognize and to solve number problems involved in the daily experiences of a pupil on the second grade level and to continue to learn through experience new concepts of numbers and words

B. Specific Objectives

1. To increase understanding of numerical concepts dealt with in Grade One
2. To improve ability to count, to read, and to write numbers to 100
3. To acquire knowledge of the 100 basic addition facts with automatic responses on those with sums of 10 or less

4. To understand meanings of signs and expressions used in addition
5. To add combinations of 1-digit numbers and 2-digit numbers without carrying
6. To acquire knowledge of the 100 basic subtraction facts with automatic responses on those with minuends up to 10
7. To understand meanings of signs and words used in subtraction
8. To subtract 2- and 3-digit numbers without borrowing
9. To develop speed and accuracy in solving simple and meaningful problems involving the foregoing number concepts and facts
10. To understand and use a number vocabulary suitable to the grade level
11. To learn use of additional units of measure
12. To tell time by the hour
13. To understand the fractional concepts of 1/2, 1/3, and 1/4
14. To understand and use United States coins up to $1.00.

C. The Work of Grade Two

1. Counting abilities
   a. To count by 1's, 5's, and 10's to 100
   b. To count by 2's to 20 and beyond as the need arises

2. Reading abilities
    a. To read numbers to 100
    b. To read simple problems involving number concepts on the grade level
3. Writing abilities
    a. To write numbers to 100
    b. To write word equivalents of numbers as needed
4. Developing number concepts
    a. By learning to measure the height, breadth, and thickness of objects and the capacity of boxes and bottles
    b. By comparisons
5. Increasing skills in addition
    a. By adding columns of three addends, sums not to exceed 18
    b. By adding with 2-digit upper addends and 2-digit lower addends (no carrying)
    c. By adding with 2-digit upper addends and 1-digit lower addend (no carrying)
6. Increasing skills in subtraction
    a. By subtracting 2- and 3-digit numbers (no borrowing)
    b. By subtracting with both minuend and subtrahend having two digits (no borrowing)
    c. By developing understanding of the 100 basic subtraction facts and emphasizing relation

to addition

7. Understanding zero facts
    a. In addition, 0 plus 0 to 9 plus 0 and 0 plus 1 to 0 plus 9 (100 basic facts)
    b. In subtraction, 0 minus 0 to 9 minus 0 (100 basic facts)
    c. With zero as a place holder
8. Understanding number facts involving higher orders
    a. Columnar addition
        (1) Combinations of three digits with sums less than 20
        (2) Combinations of three addends (no carrying)
    b. Subtraction
        (1) Numbers in minuend not to exceed 9
        (2) Subtrahend and minuend representing 2-digit numbers (no borrowing)
9. Using the fractional concepts of 1/2, 1/3, and 1/4
    a. By concrete examples with objects
10. Increasing knowledge of units of measure
    a. United States money: coins up to $1.00
    b. The calendar: day, week, month, year
    c. The clock: telling time by the hour
    d. Linear measure: inch, foot
    e. Dozen, half-dozen

11. Extending number vocabulary to include such terms as needed in experience of pupils on the second grade level

It is further recommended that responses to number situations become automatic before introducing a new fact into written practice, otherwise the pupil may resort to counting on fingers to arrive at the solution of his problems.

The foregoing placement of topics for Grade Two was derived from the following sources:

Bulletin No. 26, Florida State Department of Education, Arithmetic in the Elementary School. Tallahassee: 1942.

Bulletin No. 1120, University of the State of New York, Mathematics for Elementary Schools, A Handbook for Teachers. Albany: 1948.

Circular Series No. 32, Illinois Curriculum and Course of Study for Elementary Schools, 1943.

Clark, John R., Arthur Otis, and Caroline Hatton Clark, My Second Number Book. New York: World Book Company, 1945.

Johnson, Eleanor M., My Progress Book in Arithmetic. New York: Charles E. Merrill Company, Incorporated, 1946.

Lehman, John, and Others, In Numberland. Harrisburg: The Continental Press, 1946.

Sanders, Agnes L., Helen Schmidt, and Wayman J. Williams, Numbers for Beginners. New York: Laidlaw Brothers, Publishers, 1948.

School Document No. 5, Boston Public Schools, Course of Study for the Elementary Schools. Grade Two. City of

Stretch, Lorena B., Pauline D. Burnitt, and Nina B. Glass, *My Own Number Book*. Atlanta: The Economy Company, 1945.

Studebaker, J. W., W. C. Findley, F. B. Knight, and William S. Gray, *Number Stories*, Book Two, Life Reading Service, 1933, and *Number Stories*, Book Two, Curriculum Foundation Series. Atlanta: Scott, Foresman and Company, 1947.

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE TWO	Boston Course of Study	Florida Course of Study	Illinois Course of Study	In Numberland	My Own Number Book	My Progress Book	My Second Number Book	Numbers For Beginners	Number Stories 1933	Number Stories 1947	Frequency of Topic	Total Number of References
1. Counting by 1's to 100	x	x	x	x	x	x	x	x	x	x	10	10
2. Reading numbers from 1 to 100	x	x	x	x	x	x	x	x	x	x	10	10
3. Writing numbers from 1 to 100	x	x	x	x	x	x	x	x	x	x	10	10
4. Addition with sums to 10	x	x	x	x	x	x	x	x	x	x	10	10
5. Addition with no carrying	x	x	x	x	x	x	x	x	x	x	10	10
6. Subtraction facts with minuends to 10	x	x	x	x	x	x	x	x	x	x	10	10
7. Subtraction with no borrowing	x	x	x	x	x	x	x	x	x	x	10	10
8. One-Step problems	x	x	x	x	x	x	x	x	x	x	10	10
9. Money	x	x	x	x	x	x	x	x	x	x	10	10
10. Comparisons	x	x	x	x	x	x	x	x	x	x	10	10

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE TWO	Boston Course of Study	Florida Course of Study	Illinois Course of Study	In Numberland	My Own Number Book	My Progress Book	My Second Number Book	Numbers For Beginners	Number Stories 1933	Number Stories 1947	Frequency of Topic	Total Number of References
11. Telling time by hour	x	x	x	x	x	x	x	x	x	x	10	10
12. Counting by 2's to 20	x	x	x	x	x	x	x		x	x	9	10
13. Counting by 5's to 50	x	x	x		x		x	x	x	x	8	10
14. Addition with 2 and 3 digits	x	x	x	x	x	x	x		x		8	10
15. Subtraction of 2 and 3 digits	x	x	x	x	x	x	x		x		8	10
16. Fraction ½	x	x	x	x	x	x	x	x			8	10
17. Linear measure inch, foot		x	x	x	x	x	x		x	x	8	10
18. Calendar	x	x	x		x	x	x	x		x	8	10
19. Dozen, half dozen	x	x	x	x	x		x	x		x	8	10
20. Vocabulary	x	x		x			x	x	x	x	7	10

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE TWO	Boston Course of Study	Florida Course of Study	Illinois Course of Study	In Numberland	My Own Number Book	My Progress Book	My Second Number Book	Numbers For Beginners	Number Stories 1933	Number Stories 1947	Frequency of Topic	Total Number of References
21. Reading numbers from 100 to 200		x	x			x	x		x	x	6	10
22. Counting by 5's to 100	x	x	x	x		x	x				6	10
23. Counting by 10 to 100	x	x	x		x				x	x	6	10
24. 100 Addition facts	x	x	x		x		x		x		6	10
25. 100 Subtraction facts	x	x	x		x		x		x		6	10
26. Fractions 1/3, 1/4		x	x	x	x		x	x			6	10
27. Counting by 2's to 100	x	x	x			x	x				5	10
28. Zero as a place holder	x		x		x	x	x				5	10
29. Writing numbers from 100 to 200		x	x			x	x				4	10
30. Roman numbers				x	x	x	x				4	10

ANALYSIS OF TOPICS IN REFERENCES FOR **GRADE TWO**	Boston Course of Study	Florida Course of Study	Illinois Course of Study	In Numberland	My Own Number Book	My Progress Book	My Second Number Book	Numbers For Beginners	Number Stories 1933	Number Stories 1947	Frequency of Topic	Total Number of References
31. Reading numbers to 300						x			x	x	3	10
32. Ordinal numbers			x	x			x				3	10
33. Reading numbers to 1000						x			x		2	10
34. Geometric figures					x		x				2	10
35. Counting by 3's to 30					x						1	10
36. Telling time within 5 minutes		x									1	10
37. Percentage concept		x									1	10
38. Commercial scales		x									1	10
39. Clinical thermometer		x									1	10
40. Learning abbreviations		x									1	10

CHAPTER IV

RECOMMENDED TOPICS IN MATHEMATICS FOR GRADE THREE

Authority for the grade placement of topics for Grade Three is derived chiefly from the analyses of ten references as shown in the tables accompanying this chapter.

GRADE THREE

A. General Aims

1. To enable the child to solve number problems which he encounters in his everyday life
2. To make frequent application of number concepts to real life situations
3. To acquire mastery of basic number facts through the use of purposeful drill

B. Specific Objectives

1. To read and to write numbers of four digits
2. To read and to write Roman numerals from I to XII
3. To develop a working knowledge of the language of numbers, abbreviations, and symbols as applicable to the grade level
4. To recognize United States coins by name and value
5. To acquire mastery of the 100 basic facts of addition

6. To acquire mastery of the 100 basic facts of subtraction
7. To subtract 2- and 3-digit numbers
8. To use 2-digit multiplicand and 1-digit multiplier _with carrying_
9. To check addition and subtraction problems
10. To understand the fractional concepts of 1/2, 1/3, and 1/4
11. To use 2-digit dividend with integers 2 and 3 as divisors, no remainder and no carrying
12. To use simple one-step problems by understanding the situation, associating the correct process with the conditions given, and using the required facts automatically
13. To understand use of liquid measures, the pint, the quart, and the gallon
14. To tell time by the clock
15. To understand the use of the calendar
16. To use successfully the basic facts of multiplication

C. _The Work of Grade Three_

1. Reading and writing numbers
    a. Reading numbers to 100
    b. Writing numbers to 100
    c. Learning place value of units and tens

- d. Writing United States money, dollars, quarters, dimes, and cents

2. Addition
    - a. Columnar addition with carrying
        - (1) Adding colums of 1-digit numbers with 5 addends
        - (2) Adding 2-digit numbers with 3 addends
        - (3) Adding 3-digit numbers with 2 addends
        - (4) Adding 3- or 4-digit numbers with 3 addends
    - b. Other addition facts
        - (1) 100 basic addition facts
        - (2) Carrying in addition
        - (3) Checking in addition
3. Subtraction
    - a. Subtracting 2- and 3-digit numbers
    - b. Learning 100 basic subtraction facts
    - c. Borrowing in subtraction
    - d. Checking in subtraction
4. Multiplication
    - a. Multiplying by integers 2, 3, 4, and 5
    - b. Multiplication with carrying
5. Division
    - a. Dividing 2- and 3-digit numbers by integers 2, 3, and 4

   - b. Dividing with remainders in the quotient
6. Fractions
   - a. Fractional concepts 1/2, 1/3, and 1/4
   - b. Social experiences involving the use of these fractions
7. Units of measure
   - a. Liquid: pint, quart, gallon
   - b. Dry: peck, quart
   - c. Calendar: day, week, month, year
   - d. United States money: dollar, half-dollar, quarter, dime, nickel. cent
   - e. Time: hour, half-hour, quarter-hour, minutes
   - f. Thermometer
8. One-step problems
9. Roman numerals
10. Abbreviations
11. Vocabulary

ARITHMETIC VOCABULARY FOR THE PRIMARY LEVEL

The following list of words is recommended by the Illinois State course of study:

about
above
add
amount
answer
arithmetic
below
between
big
borrow
both
bought
buy
carry
cent
center
change
circle
clock
coin

column
combination
correct
cost
count
date
day
deep
difference
dime
distance
division
dollar
double
down
dozen
each
earn
ending
enough
equal
even
example
extra
fact
far
fare
fast
few
fill
find
foot
from
full
gallon
group
half
heavy
high
hour
inch
inside
large
left
length
less
light
like
line
little
long
lot
low
make
many
measure
middle
mile
minus
minute
money
month
more
most
much
multiplication
multiply
narrow
near
nickel
number
numeral
none
odd
of
ones
one-half
one-third
one-fourth
order
owe
own
paid
pair
part
pay
penny
piece
pint
plenty
plus
point
pound
present
price
problem
quart
quarter
quotient
remainder
right
round
row
ruler
sale
salesman
score
second
sell
selling
share
short
side
sign
single
size
skill
slow
small

sold
spend
spending
square
straight
subtract
sum
table
take
tall
test
thick
three-fourths
time
together
total
trade
triangle
twice
under
unit
up
value
week
weight
whole
worth
yard
year
zero

Authority for grade placement of topics in this chapter was derived from the following sources:

Bond, E. A., Rollo G. Reynolds, Carl N. Shuster, and Roacoe L. West, *Real Life Arithmetic*. Grade Three. New York: Charles Scribner's Sons, 1938.

Brueckner, Leo J., Foster E. Grossnickle, and Elda L. Merton, *Arithmetic We Use*. Grade Three. Philadelphia: The John C. Winston Company, 1942.

Brueckner, Leo J., C. J. Anderson, G. O. Banting, and Elda L. Merton, *The New Curriculum Arithmetics*. Grade Three. Philadelphia: The John C. Winston Company,1935.

Bulletin No. 26, Florida State Department of Education, *Arithmetic in the Elementary School*. Tallahassee: 1942.

Bulletin No. 1120, University of the State of New York, *Mathematics for Elementary Schools*, A Handbook for Teachers. Albany: 1948.

Campbell, Harold G., F. Lynwood Wren, and Worth J. Osburn, *Discovering Numbers*. New York: D. C. Heath and Company, 1947.

Circular Series No. 32, *Illinois Curriculum and Course of Study for Elementary Schools*, 1943.

Clark, John R., Caroline Hatton Clark, and Ruth I. Baldwin, *Arithmetic for Young America*. Grade Three. New York: World Book Company, 1944.

Clark, John R., Caroline Hatton Clark, and Rita Frame Dewey, *Workbook in Arithmetic*. Grade Three. New York: World Book Company, 1947.

Lennes, N. J., and L. R. Traver, *Essential Drill and Practice in Arithmetic*. New York: Laidlaw Brothers, 1944.

Lennes, N. J., Don C. Rogers, and L. R. Traver, *Learning Arithmetic*. Grade Three. Chicago: Laidlaw Brothers, 1942.

School Document No. 6, Boston Public Schools, *Course of Study for the Elementary Schools*. Grade Three. City of Boston Printing Department, 1936.

Studebaker, J. W., W. C. Findley, F. B. Knight, and G. M. Ruch, *Study Arithmetics*. Grade Three. Chicago: Scott, Foresman and Company, 1947.

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE THREE	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Discovering Numbers	Drill and Practice	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
1. Reading and writing numbers to 100	x	x	x	x	x	x	x	x	x	x	10	10
2. Subtraction 2 and 3 digits	x	x	x	x	x	x	x	x	x	x	10	10
3. Carrying and borrowing	x	x	x	x	x	x	x	x	x	x	10	10
4. Place value of units and tens	x	x	x	x	x	x	x	x	x	x	10	10
5. One-Step problems	x	x	x	x	x	x	x	x	x	x	10	10
6. U. S. money	x	x	x	x	x	x	x	x	x	x	10	10
7. Liquid measure pint, quart, gallon	x	x	x	x	x	x	x	x	x	x	10	10
8. Telling time	x	x	x	x	x	x	x	x	x	x	10	10
9. Calendar	x	x	x	x	x	x	x	x	x	x	10	10
10. Columnar addition 4 to 5 single addends	x	x	x	x		x	x	x	x	x	9	10

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE THREE	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Discovering Numbers	Drill and Practice	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
11. Addition of 3-digit numbers with 2 addends	x	x	x	x	x	x		x	x	x	9	10
12. Multiplication with carrying	x	x	x	x	x	x		x	x	x	9	10
13. Dividing 2-digit numbers by 2, 3	x	x		x	x	x	x	x	x	x	9	10
14. Fractions 1/2, 1/3, 1/4	x	x		x	x	x	x	x	x	x	9	10
15. 100 addition facts	x		x	x		x	x	x	x	x	8	10
16. Addition of 2-digit numbers with 3 addends	x		x	x	x	x		x	x	x	8	10
17. Checking addition problems	x	x	x	x			x	x		x	7	10
18. 100 subtraction facts	x			x		x	x	x	x	x	7	10
19. Checking subtraction problems	x	x	x				x	x	x	x	7	10
20. Multiplying by 2, 3, 4, and 5	x		x	x	x		x	x	x		7	10

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE THREE	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Discovering Numbers	Drill and Practice	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
21. Dividing by 2, 3, 4	x			x	x		x	x	x	x	7	10
22. Changing larger units of measure to smaller units	x			x	x	x		x	x	x	7	10
23. 3 addends of 3 and 4 digit numbers			x		x		x	x	x	x	6	10
24. Division of 2 and 3 digit numbers	x	x		x		x			x	x	6	10
25. Roman numbers	x	x		x	x			x	x		6	10
26. Vocabulary	x	x	x	x			x			x	6	10
27. Abbreviations	x			x	x	x		x	x		6	10
28. Reading and writing 4-digit numbers	x		x	x	x	x					5	10
29. Division with remainders	x			x		x			x	x	5	10
30. Dry measure quart, peck					x	x	x	x	x		5	10

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE THREE	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Discovering Numbers	Drill and Practice	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
31. Thermometer	x			x		x	x		x		5	10
32. Ordinals	x		x					x	x		4	10
33. Counting by 100's to 1000	x		x	x						x	4	10
34. Fraction 1/5	x			x	x				x		4	10
35. Geometric figures	x			x			x			x	4	10
36. Adding irregular columns 1-3 digit numbers of 5 addends	x		x			x					3	10
37. 100 basic multiplication facts			x						x		2	10
38. Fraction 1/6					x		x				2	10
39. Fractional meaning of 1/10					x		x				2	10
40. Surface measure						x	x				2	10

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE THREE	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Discovering Numbers	Drill and Practice	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
41. Counting by 3's to 36 and by 4's to 48			x								1	10
42. Counting beyond 100 by 2's, 5's, 10's						x					1	10
43. Adding 2 and 3-digit numbers of 5 addends				x							1	10
44. Division of 4-digit numbers	x										1	10
45. Doubling or taking ½ of a recipe						x					1	10
46. Fractions in rhythmic patterns 2/4, 3/4, 4/4 time						x					1	10
47. Percentage						x					1	10

CHAPTER V

RECOMMENDED TOPICS IN MATHEMATICS FOR GRADE FOUR

Selection of topics for placement in Grade Four was based on the analyses of ten textbooks and courses of study as shown in the topical frequency tables included in this chapter.

GRADE FOUR

A. General Aims

1. To emphasize relationships between all numbers and processes with numbers
2. To develop effective quantitative thinking
3. To develop accuracy and a fair degree of rapidity in the fundamental processes with small numbers
4. To develop the power to interpret and to solve simple arithmetical problems on the grade level

B. Specific Objectives

1. To keep alive the learnings and skills of the previous grades
2. To teach the use of addition and subtraction skills with larger numbers
3. To continue learning of the multiplication facts to products of 81

4. To continue learning division facts to dividends of 81
5. To develop skill in the use of fractions
6. To continue in the use of Roman numerals
7. To develop ability in solving simple two-step problems
8. To increase understanding and use of abbreviations
9. To develop understanding of simple geometric figures

C. The Work of Grade Four

1. Reading and writing numbers
    a. Reading numbers to six places
    b. Writing numbers to six places with commas
2. Addition
    a. Adding 4-digit numbers of 5 addends
    b. Checking in addition
3. Subtraction
    a. Subtracting with 3-digit minuend
    b. Subtracting with zero in the minuend
    c. Checking in subtraction
4. Multiplication
    a. Multiplying with 3- or 4-digit multiplicands
    b. Learning multiplication facts through 81
    c. Learning multiplication of dollars and cents
    d. Multiplying a whole number by a fraction

  - e. Using 2-digit multipliers
  - f. Multiplying by 10, 12, and 100
- 5. Division
  - a. Continuing short division practices
  - b. Learning long division methods
  - c. Using divisors 2 through 9
  - d. Learning 90 division facts
  - e. Dividing with United States money as dividend
  - f. Finding 1- to 3-digit quotients
  - g. Learning place value of zero in division
  - h. Checking in division
- 6. Fractions
  - a. Using fractional concepts 1/2 through 1/8, including 1/7
  - b. Multiplying a whole number by a fraction
- 7. Units of measure
  - a. Liquid: pint, quart, gallon
  - b. Dry: quart, peck, bushel
  - c. Weight: ounce, pound
  - d. Linear: inch, foot, yard
  - e. Calendar: day, week, month, year
  - f. Thermometer
  - g. Time
- 8. Two-step problems

9. Roman numerals
10. Abbreviations
11. Finding areas
12. Simple geometric figures

The foregoing grade placement of topics was derived from the following sources:

Bond, E. A., Rollo G. Reynolds, Carl N. Shuster, and Roscoe L. West, *Real Life Arithmetic*. Grade Four. Atlanta: Charles Scribner's Sons, 1938.

Brown, Joseph C., Helen Cook Mirick, J. Freeman Guy, and Albert C. Eldredge, *Champion Arithmetics*. Grade Four. Evanston: Row, Peterson and Company, 1937.

Brueckner, Leo J., C. J. Anderson, G. O. Banting, and Elda L. Merton, *The New Curriculum Arithmetics*. Grade Four. Philadelphia: The John C. Winston Company, 1939.

Brueckner, Leo J., Foster E. Grossnickle, and Elda L. Merton, *Arithmetic We Use*. Grade Four. Philadelphia: The John C. Winston Company, 1948.

Bulletin No. 26, Florida State Department of Education, *Arithmetic in the Elementary School*. Tallahassee: 1942.

Bulletin No. 1120, University of the State of New York, *Mathematics for Elementary Schools*, A Handbook for Teachers. Albany: 1948.

Campbell, Harold G., Worth J. Osburn, and Lynwood Wren, *Number Experiences*. Grade Four. Atlanta: D. C. Heath and Company, 1947.

Circular Series No. 32, *Illinois Curriculum and Course of Study for Elementary Schools*, 1943.

Clark, John R., Ruth I.Baldwin, and Caroline Hatton Clark, *Arithmetic for Young America*. Grade Four. New York: World Book Company, 1944.

Lennes N. J., Don C. Rogers, and L. R. Traver, *Learning Arithmetic*. Grade Four. Chicago: Laidlaw Brothers,1942.

Lennes N. J., and L. R. Traver, *Essential Drill and Practice in Arithmetic*. Grade Four. Chicago: Laidlaw Brothers, 1944.

School Document No. 10, Boston Public Schools, *Course of Study for the Elementary Schools*. Grade Four. City of Boston Printing Department, 1927.

Studebaker, J. W., F. B. Knight, G. M. Ruch, and W. C. Findley, *Study Arithmetics*. Grade Four. Atlanta: Scott, Foresman and Company, 1935.

Studebaker, J. W., F. B. Knight, G. M. Ruch, and W. C. Findley, *Study Arithmetics*. Grade Four. Atlanta: Scott, Foresman, and Company, 1948.

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE FOUR	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Drill and Practice	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Number Experiences	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
1. Mult. whole number by a fraction	x	x	x	x	x	x	x	x	x	x	10	10
2. 3-digit multiplicand	x	x	x	x	x	x	x	x	x	x	10	10
3. Long division	x	x	x	x	x	x	x	x	x	x	10	10
4. Short division	x	x	x	x	x	x	x	x	x	x	10	10
5. Divisors 2 through 9	x	x	x	x	x	x	x	x	x	x	10	10
6. Addition 3-digit numbers of 4 addends	x	x	x	x	x	x	x	x	x	x	10	10
7. Fractions 1/2, 1/3, 1/4	x	x	x	x	x	x	x	x	x	x	10	10
8. Liquid measure	x	x	x	x	x	x	x	x	x	x	10	10
9. Linear measure	x	x	x	x	x	x	x	x	x	x	10	10
10. Weight measure	x	x	x	x	x	x	x	x	x	x	10	10

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE FOUR	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Drill and Practice	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Number Experiences	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
11. Measure dozen	x	x	x	x	x	x	x	x	x	x	10	10
12. Measure time	x	x	x	x	x	x	x	x	x	x	10	10
13. Calendar	x	x	x	x	x	x	x	x	x	x	10	10
14. Subtraction 3-digit minuend	x	x	x	x	x		x	x	x	x	9	10
15. Zero in the minuend	x	x	x	x	x		x	x	x	x	9	10
16. 2-digit multipliers	x		x	x	x	x	x	x	x	x	9	10
17. Multiplication of dollars and cents	x	x	x	x	x		x	x	x	x	9	10
18. Division of U. S. money	x	x	x	x	x		x	x	x	x	9	10
19. Measure dry		x	x	x	x	x	x	x	x	x	9	10
20. Thermometer	x	x	x		x	x	x	x	x	x	9	10

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE FOUR	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Drill and Practice	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Number Experiences	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
21. Reading and writing numbers to six places	x	x	x		x		x	x	x	x	8	10
22. Subtraction 4-5 digit minuend	x	x	x	x			x	x	x	x	8	10
23. 100 multiplication facts	x		x	x	x		x	x	x	x	8	10
24. Multiplying by 12, 10, 100	x		x	x	x	x	x	x	x		8	10
25. 90 division facts	x		x	x	x		x	x	x	x	8	10
26. Place value of zero in division	x	x		x		x	x	x	x	x	8	10
27. Roman numbers	x	x		x		x	x	x	x	x	8	10
28. Two-Step problems	x	x		x		x	x	x	x	x	8	10
29. Abbreviations	x	x	x	x			x	x	x	x	8	10
30. Quotients 1-3 digits	x	x	x				x	x	x	x	7	10

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE FOUR	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Drill and Practice	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Number Experiences	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
31. Checking division	x	x	x				x	x	x	x	7	10
32. Fractions to 1/8 (including 1/7)	x		x	x			x	x	x		6	10
33. 4-digit multiplicand	x		x	x			x		x		5	10
34. Geometric figures	x	x				x	x	x			5	10
35. Finding area				x	x	x	x	x			5	10
36. Addition, 4-digit numbers of 5 addends	x		x		x			x			4	10
37. Multiplying by 2 and 3 digit numbers	x						x	x	x		4	10
38. Graphs			x			x		x		x	4	10
39. Relation between time and distance	x			x				x			3	10
40. Dividing by 2-12			x		x						2	10

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE FOUR	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Drill and Practice	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Number Experiences	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
41. Fractions to 1/8 (excluding 1/7)		x								x	2	10
42. Finding perimeter							x	x			2	10
43. Multiplication to products of 40						x					1	10
44. Multiplying by 2 1/2						x					1	10
45. Dividing by 2-digit numbers			x								1	10

CHAPTER VI

RECOMMENDED TOPICS IN MATHEMATICS
FOR GRADE FIVE

An examination of the topical frequency tables in this chapter as compared to tables of the preceding grades will reveal a greater degree of uniformity in grade placement of topics. Few discrepancies will be noted in the work of the last two grades in the elementary school.

GRADE FIVE

A. General Aims

1. To develop skill in the four processes
2. To stimulate and to develop an interest in arithmetic by associating problems with significant number situations in the pupil's daily life

B. Specific Objectives

1. To develop speed and accuracy in the four fundamental processes with integers, fractions, and mixed numbers
2. To increase understanding of long division and the value of zero in division
3. To develop accuracy and speed in manipulation of numbers
4. To develop understanding of geometric figures

5. To develop understanding of graphs
6. To read and to write Roman numerals to C
7. To understand relation between speed, distance, and time
8. To secure proficiency in solving two-step problems
9. To extend knowledge and use of units of measure

C. The Work of Grade Five

1. Reading and writing numbers
    - a. Reading decimals
    - b. Writing common fractions as decimals
2. Addition
    - a. Adding integers
    - b. Adding like fractions
    - c. Adding unlike fractions
    - d. Adding decimals
    - e. Checking in addition
3. Subtraction
    - a. Subtracting integers
    - b. Subtracting like fractions
    - c. Subtracting unlike fractions
    - d. Subtracting mixed numbers
    - e. Subtracting decimals
    - f. Checking in subtraction

4. Multiplication
    a. Using 2- and 3-digit multipliers
    b. Using multipliers containing zero
    c. Multiplying a fraction by an integer
    d. Multiplying a mixed number by an integer
5. Division
    a. Using 2-digit divisors
    b. Using divisors ending in zero
    c. Dividing by long division method with remainders
    d. Dividing with zeros in the quotient
    e. Checking in division
6. Fractions
    a. Adding like and unlike fractions
    b. Subtracting like and unlike fractions
    c. Adding and subtracting decimal fractions
    d. Multiplying integers by fractions
    e. Changing improper fractions to mixed numbers
7. Mixed numbers
    a. Adding mixed numbers
    b. Subtracting mixed numbers
    c. Multiplying mixed numbers by an integer
    d. Changing improper fraction to mixed number

8. Units of measure
    a. Dry: quart, peck, bushel
    b. Liquid: pint, quart, gallon
    c. Linear: inch, foot, yard, rod, mile
    d. Weight: ounce, pound, ton
    e. Surface: square foot, square yard, square mile
9. Problems
    a. Speed, distance, time
    b. Averages
    c. Square measures
    d. Two-step problems
10. Graphs, bar, line
11. Roman numerals
12. Geometric figures

Recommended topics for placement in Grade Five are derived from the following sources:

Bond, E. A., Rollo G. Reynolds, Carl N. Shuster, and Roscoe L. West, *Real Life Arithmetic*. Grade Five. New York: Charles Scribner's Sons, 1938.

Brueckner, Leo J., C. J. Anderson, G. O. Banting, and Elda L. Merton, *The New Curriculum Arithmetics*. Grade Five. Philadelphia: The John C. Winston Company, 1939.

Brueckner, Leo J., Foster E. Grossnickle, and Elda L. Merton, *Arithmetic We Use*. Grade Five. Philadelphia: The John C. Winston Company, 1942.

Bulletin No. 26, Florida State Department of Education, *Arithmetic in the Elementary School*. Tallahassee: 1942.

Campbell, Harold G., F. Lynwood Wren, and W. J. Osburn, *Number Activities*. Grade Five. New York: D. C. Heath and Company, 1947.

Circular Series No. 32, *Illinois Curriculum and Course of Study for Elementary Schools*, 1943.

Clark, John R., Monica M. Hoye, and Caroline Hatton Clark, *Arithmetic for Young America*. Grade Five. New York: World Book Company, 1944.

Knight, F. B., J. W. Studebaker, and G. M. Ruch, *Study Arithmetics*. Grade Five. Chicago: Scott, Foresman and Company, 1948.

Lennes, N. J., Don C. Rogers, and L. R. Traver, *Learning Arithmetic*. Grade Five. Atlanta: Laidlaw Brothers, Publishers, 1942.

Lennes, N. J., and L. R. Traver, *Essential Drill and Practice in Arithmetic*. Grade Five. Atlanta: Laidlaw Brothers, Publishers, 1944.

School Document No. 8, Boston Public Schools, *Course of Study for the Elementary Schools*. Grade Five. City of Boston Printing Department, 1926.

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE FIVE	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Drill and Practice	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Number Activities	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
1. Addition, integers, fractions, mixed numbers, decimals	x	x	x	x	x	x	x	x	x	x	10	10
2. Addition like fractions	x	x	x	x	x	x	x	x	x	x	10	10
3. Subtraction, integers, fractions, mixed numbers, decimals	x	x	x	x	x	x	x	x	x	x	10	10
4. 2-3 digit multipliers	x	x	x	x	x	x	x	x	x	x	10	10
5. Multiplier containing zero	x	x	x	x	x	x	x	x	x	x	10	10
6. 2-digit divisors	x	x	x	x	x	x	x	x	x	x	10	10
7. Changing improper fraction to mixed number	x	x	x	x	x	x	x	x	x	x	10	10
8. Measures, liquid, dry, weight, linear, surface	x	x	x	x	x	x	x	x	x	x	10	10
9. Finding averages	x	x	x	x	x	x	x	x	x	x	10	10
10. Two-Step problems	x	x	x	x	x	x	x	x	x	x	10	10

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE FIVE	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Drill and Practice	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Number Activities	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
11. Add fractions with unlike denominator	x		x	x	x	x	x	x	x	x	9	10
12. Subt. fractions with unlike denominator	x		x	x	x	x	x	x	x	x	9	10
13. Mult. fraction by whole number	x	x	x	x	x		x	x	x	x	9	10
14. Long division with remainder	x	x	x	x	x		x	x	x	x	9	10
15. Divisors ending in zero	x	x		x	x	x	x	x	x	x	9	10
16. Zero in quotient	x	x		x	x	x	x	x	x	x	9	10
17. Surface measurement	x	x	x	x	x	x	x	x	x		9	10
18. Checking in addition	x	x	x			x	x	x	x	x	8	10
19. Checking in subtraction	x	x	x			x	x	x	x	x	8	10
20. Problems of rate, distance, time	x	x		x	x		x	x	x	x	8	10

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE FIVE	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Drill and Practice	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Number Activities	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
21. Simple geometric figures	x	x			x	x	x	x	x	x	8	10
22. Checking division	x	x	x	x			x	x	x	x	8	10
23. Reading and writing decimals	x	x			x	x	x	x	x		7	10
24. Roman numbers to 100 or beyond	x	x			x	x	x	x		x	7	10
25. Mult. mixed number by whole number	x		x	x	x		x	x			6	10
26. Graphs	x	x	x		x	x		x			6	10
27. Writing common fractions as decimals	x				x	x		x	x		5	10
28. Fractions in rhythm	x		x		x				x		4	10
29. Cubic measurement				x		x	x		x		4	10
30. Multiplying fraction by fraction	x		x		x						3	10

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE FIVE	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Drill and Practice	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Number Activities	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
31. Long division 3-digit divisor			x		x			x			3	10
32. Cancellation	x		x		x						3	10
33. Vocabulary		x	x			x					3	10
34. Time zones					x			x			2	10
35. Division of fractions and mixed numbers			x								1	10
36. Percentage					x						1	10
37. Measurement metric system		x									1	10
38. Troy measurement		x									1	10

CHAPTER VII

RECOMMENDED TOPICS IN MATHEMATICS
FOR GRADE SIX

The course of study in arithmetic for Grade Six was selected according to the grade placement of topics in ten textbooks and state courses of study as shown in the topical frequency tables included in this chapter.

GRADE SIX

A. General Aims

1. To teach pupils to apply their knowledge and skills in real life situations
2. To provide opportunities for relating the principles and processes of arithmetic to the pupil's environment
3. To develop power in solution of problems using integers, fractions, and decimals
4. To develop habits of checking results in all work

B. Specific Objectives

1. To increase skill in the four fundamental processes with integers, decimals, common fractions, and mixed numbers
2. To develop an understanding of per cents and an

awareness of their importance in life situations

3. To extend knowledge and increase skills in the manipulation of denominate numbers
4. To develop understanding of the importance of budgeting and keeping accounts
5. To extend knowledge of scale drawings and graphs

C. The Work of Grade Six

1. Reading and writing numbers to one billion
2. Addition
    - a. Adding integers of higher orders
    - b. Adding decimals
    - c. Rounding off decimals
    - d. Adding like and unlike fractions
    - e. Adding mixed numbers
    - f. Adding denominate numbers
    - g. Checking in addition
3. Subtraction
    - a. Subtracting integers of higher orders
    - b. Subtracting decimals
    - c. Subtracting like and unlike fractions
    - d. Subtracting denominate numbers
    - e. Subtracting mixed numbers
    - f. Checking in subtraction

4. Multiplication
    a. Changing form of fraction to higher order
    b. Multiplying mixed numbers by mixed numbers
    c. Multiplying denominate numbers
    d. Multiplying by means of short cuts with zero
    e. Multiplying fractions by cancellation
    f. Multiplying decimals
    g. Multiplying of United States money
    h. Checking in multiplication
5. Division
    a. Dividing with decimals
    b. Using 3-digit divisors
    c. Dividing mixed numbers by an integer
    d. Dividing mixed numbers by a fraction
    e. Dividing proper fractions
    f. Dividing with denominate numbers
    g. Dividing with United States money
    h. Checking in division
6. Fractions
    a. Reading and writing decimal fractions
    b. Multiplying and dividing mixed numbers by an integer
    c. Dividing a mixed number by a fraction
    d. Adding like and unlike fractions
    e. Subtracting like and unlike fractions

    f. Changing common fraction to a decimal
    g. Multiplying fractions by cancellation
    h. Rounding off decimals
    i. Using per cents
    j. Changing form of fraction to a higher order

7. Mixed numbers
    a. Adding mixed numbers
    b. Subtracting mixed numbers
    c. Multiplying mixed number by a mixed number
    d. Dividing mixed numbers
    e. Multiplying mixed numbers by integers
8. Units of measure
    a. Increasing and decreasing a recipe
    b. Using the four processes with United States money
    c. Extending knowledge of units of measure to include cubic measure
    d. Using the four processes with denominate numbers
9. Problems
    a. Distance, rate, and time
    b. Finding averages
    c. Two-step problems
10. Graphs, bar and line

11. Scale drawings
12. Geometric figures
13. Accounts and budgets
14. Roman numerals

The foregoing grade placement of topics was derived from the following references:

Bond, E. A., Rollo G. Reynolds, Carl N. Shuster, and Roscoe L. West, *Real Life Arithmetic*. Grade Six. New York: Charles Scribner's Sons, 1938.

Brueckner, Leo J., Foster E. Grossnickle, and Elda L. Merton, *Arithmetic We Use*. Grade Six. Philadelphia: The John C. Winston Company, 1948.

Bulletin No. 26, Florida State Department of Education, *Arithmetic in the Elementary Schools*. Tallahassee: 1942.

Campbell, Harold, F. Lynwood Wren, and W. J. Osburn, *Exploring Numbers*. Grade Six. New York: D. C. Heath and Company, 1947.

Circular Series No. 32, *Curriculum and Course of Study for Elementary Schools of Illinois*, 1943.

Clark, John R., Monica M. Hoye, and Caroline Hatton Clark, *Arithmetic for Young America*. Grade Six. New York: World Book Company, 1944.

Knight, F. B., J. W. Studebaker, and G. M. Ruch, *Study Arithmetic*. Grade Six. Chicago: Scott, Foresman and Company, 1936.

Knight, F. B., J. W. Studebaker, and G. M. Ruch, *Study Arithmetic*. Grade Six. Revised edition. Chicago: Scott, Foresman and Company, 1948.

Lennes, N. J., Don C. Rogers, and L. R. Traver, *Learning Arithmetic*. Grade Six. Atlanta: Laidlaw Brothers, Publishers, 1942.

Lennes, N. J., and L. R. Traver, *Essential Drill and Practice in Arithmetic*. Grade Six. Atlanta: Laidlaw Brothers, Publishers, 1944.

School Document No. 18, Boston Public Schools, *Course of Study for the Elementary Schools*. Grade Six. City of Boston Printing Department, 1926.

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE SIX	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Drill and Practice	Exploring Numbers	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
1. Reading and writing decimals	x	x	x	x	x	x	x	x	x	x	10	10
2. Add, subtract, multiply, and divide decimals	x	x	x	x	x	x	x	x	x	x	10	10
3. Add, subtract, multiply, and divide U. S. money	x	x	x	x	x	x	x	x	x	x	10	10
4. Addition of unlike fractions	x	x	x	x	x	x	x	x	x	x	10	10
5. Addition of mixed numbers	x	x	x	x	x	x	x	x	x	x	10	10
6. Addition of decimals and whole numbers	x	x	x	x	x	x	x	x	x	x	10	10
7. Subtraction of fractions	x	x	x	x	x	x	x	x	x	x	10	10
8. Multiplying and dividing mixed numbers	x	x	x	x	x	x	x	x	x	x	10	10
9. Division of proper fractions	x	x	x	x	x	x	x	x	x	x	10	10
10. Division of mixed number by a fraction	x	x	x	x	x	x	x	x	x	x	10	10

ANALYSIS OF TOPICS IN REFERENCES FOR **GRADE SIX**	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Drill and Practice	Exploring Numbers	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
11. Area	x	x	x	x	x	x	x	x	x	x	10	10
12. Two-Step problems	x	x	x	x	x	x	x	x	x	x	10	10
13. Changing fractions to decimals	x	x	x	x	x	x	x	x	x	x	10	10
14. Changing fractions to higher order	x	x	x	x	x	x	x	x	x	x	10	10
15. Subtraction of mixed numbers	x	x		x	x	x	x	x	x	x	9	10
16. Rounding off decimals	x	x	x		x	x	x	x	x	x	9	10
17. Graphs	x	x		x	x	x	x	x	x	x	9	10
18. Checking problems	x	x	x	x	x		x	x	x		8	10
19. Accounts and budgets	x	x	x	x	x	x	x	x			8	10
20. 3-digit divisors	x		x	x	x	x		x		x	7	10

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE SIX	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Drill and Practice	Exploring Numbers	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
21. Per cents	x			x	x	x	x	x	x		7	10
22. Averages	x	x	x		x	x	x		x		7	10
23. Drawing to scale	x	x			x	x	x	x		x	7	10
24. Reading and writing numbers to billions	x		x		x		x	x		x	6	10
25. Add, subtract, multiply, and divide denominate numbers		x		x	x			x	x	x	6	10
26. Cancellation	x	x		x	x	x			x		6	10
27. Short-cut in multiplying with zero	x	x	x		x	x		x			6	10
28. Geometric figures				x	x		x	x	x	x	6	10
29. Cubic measure	x			x	x	x	x	x			6	10
30. Roman numbers	x				x		x	x		x	5	10

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE SIX	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Drill and Practice	Exploring Numbers	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
31. Distance, rate, and time problems	x	x	x	x		x					5	10
32. Increase and decrease recipe	x		x	x		x	x				5	10
33. Formulas				x			x	x	x		4	10
34. Three-Step problems			x	x						x	3	10
35. Net weight and net cost				x		x			x		3	10
36. Making out bills				x	x			x			3	10
37. Ratio							x		x		2	10
38. Metric measure		x				x					2	10
39. Thermometer					x	x					2	10
40. Circumference and diameter of circle				x					x		2	10

ANALYSIS OF TOPICS IN REFERENCES FOR GRADE SIX	Arithmetic For Young America	Arithmetic We Use	Boston Course of Study	Drill and Practice	Exploring Numbers	Florida Course of Study	Illinois Course of Study	Learning Arithmetic	Real Life Arithmetic	Study Arithmetic	Frequency of Topic	Total Number of References
41. Writing checks				x	x						2	10
42. Troy weight		x									1	10
43. Problems without numbers			x								1	10
44. Latitude and longitude						x					1	10

CHAPTER VIII

SUMMARY

An analysis of the Florida program in mathematics for the elementary school, as compared with other programs examined in this study, reveals that on the whole the State of Florida offers the school child a greatly enriched program. The controversial question of a stepped-up program based on grade readiness or an enriched program based on the normal experiences and activities of the pupils and an earlier introduction of certain number concepts is obvious from a study of the tables in this thesis. Florida has attempted to embody some factors from both types though in general the Florida program follows the latter course, thus providing for increased understandings and knowledge as the need arises in the social experiences of the child.

For Grade One Florida includes all the topics recommended in this study for Grade One and offers in addition the following topics:

- Ordinals, first to thirty-first
- Units of measure
    - a. Liquid: quart, pint
    - b. Linear: inch, foot, yard
- Fractions, 1/4, 1/3

Calendar

Fractional measures, 1/2 cup, 1/4 cup, 1/3 cup,1/4 lb.

The clinical thermometer

One dollar bills and five dollar bills

For Grade Two Florida recommends all the topics proposed in this thesis except zero as a place holder. Topics not included in the proposed outline but recommended by Florida are:

Telling time to within five minutes

Commercial scales

The clinical thermometer

Percentage concept

The Florida course of study contains all the topics recommended for Grade Three except the following:

Checking addition and subtraction problems

Multiplying by 2, 3, and 4

Roman numerals

Vocabulary emphasis

Dividing by 4

Adding 3- and 4-digit numbers of 3 addends

Florida recommends instead:

Adding irregular columns of 1- to 3-digit numbers of 5 addends

Counting beyond 100 by 2's, 5's, and 10's

Fractions in rhythmic patterns

Doubling or taking 1/2 a recipe

Percentage concept

The Florida program for Grade Four includes all the recommended topics except the following:

Two-step problems

Fractions through 1/8, including 1/7

Roman numerals

Checking in division

4-digit multiplicand

1- to 3-digit quotients

Place value of zero in division

Abbreviations

Subtraction with 4- to 5-digit minuends

Geometric figures

Florida offers instead division by numbers 2 to 12.

In topics proposed for Grade Five Florida is in agreement with the recommended sequence of topics except in a few instances. Florida does not include:

Cancellation

Multiplication of a fraction by a fraction

The Florida course of study for Grade Six includes all of the recommended topics except the following:

Checking problems

Geometric figures

The four processes with denominate numbers

Reading and writing numbers to one billion

The Florida course of study includes:

The metric system

Clinical thermometer

Net weight and net cost

In the light of those practices accepted by the majority of textbooks and courses of study examined, certain weaknesses in the Florida program are evident. While the majority of authorities concerned in this study recommend the checking of problems in addition, subtraction, division, and multiplication, Florida does not include this practice.

The Florida course places little or no emphasis on vocabulary. Though teachers of mathematics often deplore the scanty mathematics vocabulary of students in junior and senior high schools, this lack of emphasis on vocabulary was found in several of the textbooks examined.

While apparently attempting to follow a stepped-up program in the placement of topics for Grade Four, Florida's program for Grade Three is inconsistent with this practice. Such topics as doubling or taking one half of a recipe, fractions in rhythmic patterns, and the percentage concept are included in the program for Grade Three. In the Sixth

Grade Florida introduces the metric system commonly begun in the upper grades.

In general Florida's course of study is in harmony with most of those practices subscribed to by the majority of authorities referred to in this study. The Florida program may be regarded as a blending of the two concepts of grade placement: the stepped-up program and the early introduction of some controversial topics such as the fraction and the percentage concept.

The present study has revealed the following trends and practices in arithmetic:

1. Building up readiness for arithmetic teaching in the primary grades by providing social experiences and activities which involve number
2. Utilizing as a lesson every natural situation which may involve number processes
3. Reducing formal arithmetic in the primary grades and substituting social experiences involving manipulation of numbers
4. Correlating arithmetic teaching with problems met by pupils in their daily living
5. Delaying until a later grade certain topics in arithmetic

6. Making a more gradual transition from concrete number situations to abstract number concepts
7. Tending to spread fractions over a longer period of time
8. Harmonizing the rate of progress in arithmetic with the mental maturity or grade readiness of pupils instead of conforming to an inflexible program
9. Providing for individual differences by engaging in a variety of number experiences, by setting individual achievement standards to conform with pupil capacity, and by providing diversified assignments within class groups

The sequence of topics recommended in this study is not submitted as a guaranteed optimum arrangement of topics. It is submitted, however, as representing the trends in modern programs in grade placement of topics for elementary school arithmetic. Later investigations into this problem may tend to alter this arrangement.

BIBLIOGRAPHY

BIBLIOGRAPHY

A. BOOKS

Bond, E. A., Rollo G. Reynolds, Carl N. Shuster, and Roscoe L. West, *Real Life Arithmetic*, Grade III. Philadelphia: Charles Scribner's Sons, 1938. 256 pp.

Bond, E. A., Rollo G. Reynolds, Carl N. Shuster, and Roscoe L. West, *Real Life Arithmetic*, Grade IV. Philadelphia: Charles Scribner's Sons, 1938. 256 pp.

Bond, E. A., Rollo G. Reynolds, Carl N. Shuster, and Roscoe L. West, *Real Life Arithmetic*, Grade V. Philadelphia: Charles Scribner's Sons, 1938. 256 pp.

Bond, E. A., Rollo G. Reynolds, Carl N. Shuster, and Roscoe L. West, *Real Life Arithmetic*, Grade VI. Philadelphia: Charles Scribner's Sons, 1938. 268 pp.

Brown, Joseph C., Helen Cook Mirick, J. Freeman Guy, and Albert C. Eldredge, *Champion Arithmetics*, Grade IV. Stepped-up edition; Evanston: Row Peterson and Company, 1937. 512 pp.

Brueckner, Leo J., C. J. Anderson, G. O. Banting, and Elda L. Merton, *The New Curriculum Arithmetics*, Grade III. Triangle series; Philadelphia: The John C. Winston Company, 1935. 274 pp.

Brueckner, Leo J., C. J. Anderson, G. O. Banting, and Elda L. Merton, *The New Curriculum Arithmetics*, Grade IV. Triangle series; Philadelphia: The John C. Winston Company, 1935. 274 pp.

Brueckner, Leo J., C. J. Anderson, G. O. Banting, and Elda L. Merton, *The New Curriculum Arithmetic*, Grade IV. Philadelphia: The John C. Winston Company, 1939. 274 pp.

Brueckner, Leo J., C. J. Anderson, G. O. Banting, and Elda L. Merton, *The New Curriculum Arithmetic*, Grade V. Philadelphia: The John C. Winston Company, 1939. 274 pp.

Brueckner, Leo J., C. J. Anderson, G. O. Banting, and Elda L. Merton, *The Triangle Arithmetics*, Grade IV. Philadelphia: The John C. Winston Company, 1928. 240 pp.

Brueckner, Leo J., C. J. Anderson, G. O. Banting, and Elda L. Merton, *The Triangle Arithmetics*, Grade V. Philadelphia: The John C. Winston Company, 1928. 256 pp.

Brueckner, Leo J., Foster E. Grossnickle, and Elda L. Merton, *Arithmetic We Use*, Grade III. Philadelphia: The John C. Winston Company, 1942. 278 pp.

Brueckner, Leo J., Foster E. Grossnickle, and Elda L. Merton, *Arithmetic We Use*, Grade IV. Philadelphia: The John C. Winston Company, 1942. 278 pp.

Brueckner, Leo J., Foster E. Grossnickle, and Elda L. Merton, *Arithmetic We Use*, Grade V. Philadelphia: The John C. Winston Company, 1942. 308 pp.

Brueckner, Leo J., Foster E. Grossnickle, and Elda L. Merton, *Arithmetic We Use*, Grade VI. Philadelphia: The John C. Winston Company, 1942. 308 pp.

Brueckner, Leo J., Foster E. Grossnickle, and Elda L. Merton, *Arithmetic We Use*, Grade III. Philadelphia: The John C. Winston Company, 1947. 308 pp.

Brueckner, Leo J., Foster E. Grossnickle, and Elda L. Merton, *Arithmetic We Use*, Grade IV. Philadelphia: The John C. Winston Company, 1948. 308 pp.

Brueckner, Leo J., Foster E. Grossnickle, and Elda L. Merton, *Arithmetic We Use*, Grade VI. Philadelphia: The John C. Winston Company, 1948. 306 pp.

Brueckner, Leo J., and Others, *The Changing Elementary School*. Report of the Regents's Inquiry; New York: Inor Publishing Company, Incorporated, 1939. 387 pp.

Buckingham, Burdette R., *Elementary Arithmetic*, New York: Ginn and Company, 1947. 735 pp.

Campbell, Harold G., and F. Lynwood Wren, *Discovering Numbers*, Grade III. Atlanta: D. C. Heath and Company, 1947. 275 pp.

Campbell, Harold G., and F. Lynwood Wren, *Number Experiences*, Grade IV. Atlanta: D. C. Heath and Company, 1947. 242 pp.

Campbell, Harold G., and F. Lynwood Wren, *Number Activities*, Grade V. Atlanta: D. C. Heath and Company, 1947. 242 pp.

Campbell, Harold G., and F. Lynwood Wren, *Exploring Numbers*, Grade VI. Atlanta: D. C. Heath and Company, 1947. 258 pp.

Caswell, Hollis L., and Doak S. Campbell, *Curriculum Development*, Atlanta: American Book Company, 1935. 580 pp.

Clark, John R., Arthur S. Otis, and Caroline Hatton Clark, *My First Number Book*. New York: World Book Company, 1945. 80 pp.

Clark, John R., Arthur S. Otis, and Caroline Hatton Clark, *My Second Number Book*. New York: World Book Company, 1945. 112 pp.

Clark, John R., Caroline Hatton Clark, and Rolland R. Smith, *Workbook in Arithmetic*, Grade III. New York: World Book Company, 1947. 144 pp.

Clark, John R., Caroline Hatton Clark, and Rolland R. Smith, *Workbook in Arithmetic*, Grade IV. New York: World Book Company, 1947. 144 pp.

Clark, John R., Caroline Hatton Clark, and Rolland R. Smith, *Workbook in Arithmetic*, Grade V. New York: World Book Company, 1947. 144 pp.

Clark, John R., Caroline Hatton Clark, and Rolland R. Smith, *Workbook in Arithmetic*, Grade VI. New York: World Book Company, 1947. 160 pp.

Clark, John R., Monica M. Hoye, and Caroline Hatton Clark, *Arithmetic For Young America*, Grade III. New York: World Book Company, 1944. 294 pp.

Clark, John R., Monica M. Hoye, and Caroline Hatton Clark, *Arithmetic For Young America*, Grade IV. New York: World Book Company, 1944. 277 pp.

Clark, John R., Monica M. Hoye, and Caroline Hatton Clark, *Arithmetic For Young America*, Grade V. New York: World Book Company, 293 pp.

Clark, John R., Monica M. Hoye, and Caroline Hatton Clark, *Arithmetic For Young America*, Grade VI. New York: World Book Company, 1944. 281 pp.

Fernald, Grace M., *Remedial Techniques in Basic School Subjects*. New York : McGraw-Hill Book Company, Incorporated, 1943. 347 pp.

Hildreth, Gertrude, *Learning the Three R's*. Second edition; Philadelphia: Educational Publishers, Incorporated, 1946. 890 pp.

Johnson, Eleanor M., *My Progress Book in Arithmetic*, Number II. New York: Charles E.Merrill Company, Incorporated, 1946. 48 pp.

Knight, F. B., J. W. Studebaker, G. M. Ruch, and W. C. Findley, *Study Arithmetic*, Grade IV. Atlanta: Scott, Foresman and Company, 1935. 344 pp.

Knight, F. B., J. W. Studebaker, G. M. Ruch, and W. C. Findley, *Study Arithmetic*, Grade IV. Atlanta: Scott, Foresman and Company, 1940. 344 pp.

Knight, F. B., J. W. Studebaker, and G. M. Ruch, *Study Arithmetic*, Grade V. Atlanta: Scott, Foresman and Company, 1940. 344 pp.

Knight , F. B., J. W. Studebaker, and G. M. Ruch, *Study Arithmetic*, Grade VI. Atlanta: Scott, Foresman and Company, 1936. 376 pp.

Knight, F. B., J. W. Studebaker, and G. M. Ruch, *Study Arithmetic*, Grade VI. Atlanta: Scott, Foresman and Company, 1940. 376 pp.

Knight, F. B., J. W. Studebaker, and G. M. Ruch, *Study Arithmetic*, Grade V. Atlanta: Scott, Foresman and Company, 1948. 342 pp.

Knight, F. B., J. W. Stdebaker, and G. M. Ruch, *Study Arithmetic*, Grade VI. Atlanta: Scott, Foresman and Company, 1948. 437 pp.

Lennes, N. J., Don C. Rogers, and L. R. Traver, *Learning Arithmetic*, Grade III. Atlanta: Laidlaw Brothers, Publishers, 1942. 220 pp.

Lennes, N. J., Don C. Rogers, and L. R. Traver, *Learning Arithmetic*, Grade IV. Atlanta: Laidlaw Brothers, Publishers, 1942, 220 pp.

Lennes, N. J., Don C. Rogers, and L. R. Traver, *Learning Arithmetic*, Grade V. 252 pp.

Lennes, N. J., Don C. Rogers, and L. R. Traver, *Learning Arithmetic*, Grade VI. Atlanta: Laidlaw Brothers, Publishers, 1942. 252 pp.

Lennes, N. J., and L. R. Traver, *Essential Drill and Practice in Arithmetic*, Grade III. Atlanta: Laidlaw Brothers, Publishers, 1944. 152 pp.

Lennes, N. J., and L. R. Traver, *Essential Drill and Practice in Arithmetic*, Grade IV. Atlanta: Laidlaw Brothers, Publishers, 1944. 152 pp.

Lennes, N. J., and L. R. Traver, *Essential Drill and Practice in Arithmetic*, Grade V. Atlanta: laidlaw Brothers, Publishers, 1944. 152 pp.

Lennes, N. J., and L. R. Traver, *Essential Drill and Practice in Arithmetic*, Grade VI. Atlanta: Laidlaw Brothers, Publishers, 1944. 152 pp.

Merton, Elda L., and Leo J. Brueckner, *Our Numberland*, Grade I. Atlanta: The John C. Winston Company, 1948. 128 pp.

Osburn, Jesse, and Adeline Riefling, *Cage Champions*. Atlanta: Webster Publishing Company, 1948. 340 pp.

Riess, Anita, Maurice L. Hartung, and Catherine Mahoney, *Numbers We See*, Grade I. Atlanta: Scott, Foresman and Company, 1948. 162 pp.

Roantree, William F., and Mary S. Taylor, *An Arithmetic for Teachers*. New York: The Macmillan Company, 1947. 515 pp.

Sanders, Agnes L., Helen Schmidt, and Wayman J. Williams, *Numbers for Beginners*, Part I. Atlanta: Laidlaw Brothers, Publishers, 1948. 80 pp.

Sanders, Agnes L., Helen Schmidt, and Wayman J. Williams, *Numbers for Beginners*, Part II. Atlanta: Laidlaw Brothers Publishers, 1948. 128 pp.

Schlegel, Albert G. W., William H. Bristow, Armeda P. Eberly, and Ella Stiles, *The New Continental Practice Exercises in Arithmetic*, Grade II. Harrisburg: The Continental Press, 1948. 128 pp.

Schlegel, Albert G. W., William H. Bristow, Armeda P. Eberly, and Ella Stiles, *In Numberland*, Grade II. Harrisburg: The Continental Press, 1946. 96 pp.

Sharp, L. A., and C. E. Herring, *Arithmetic Drill Tablet*, Grade III. Atlanta: The Economy Company, 1934. 144 pp.

Sharp, L. A., and C. E. Herring, *Arithmetic Drill Tablet*, Grade IV. Atlanta: The Economy Company, 1934. 144 pp.

Sharp, L. A., and C. E. Herring, *Arithmetic Drill Tablet*, Grade V. Atlanta: The Economy Company, 1934. 144 pp.

Sharp, L. A., and C. E. Herring, *Arithmetic Drill Tablet*, Grade VI. Atlanta: The Economy Company, 1934. 144 pp.

Spitzer, Herbert, *The Teaching of Arithmetic*. Boston: Houghton Mifflin Company, 1948. 392 pp.

Stratemeyer, Florence B., Hamden L. forkner, Margaret G. McKim, and Associates, *Developing a Curriculum for Modern Living*. New York: Bureau of Publications, Teachers College, Columbia University, 1947. 558 pp.

Stretch, Lorena B., Pauline D. Burnitt, and Grace Melear, *My Own Number Book*, Grade I. Atlanta: The Economy Company, 1948. 96pp.

Stretch, Lorena B., Pauline D. Burnitt, and Nina B. Glass, *My Own Number Book*, Grade II. Atlanta: The Economy Company, 1945. 128 pp.

Studebaker, J. W., W. C. Findley, andF. B. Knight, *Number Stories*, Grade I. Atlanta: Scott, Foresman and Company, 1947. 158 pp.

Studebaker, J. W., W. C. Findley, and F. B. Knight, *Number Stories*, Grade II. Atlanta: Scott, Foresman and Company, 1933. 233 pp.

Studebaker, J. W., W. C. Findley, and F. B. Knight, *Number Stories*, Grade II. Atlanta: Scott, Foresman and Company, 1947. 253 pp.

Studebaker, J. W., W. C. Findley, F. B. Knight, and G. M. Ruch, *Study Arithmetics*, Grade III. Atlanta: Scott, Foresman and Company, 1947. 348 pp.

Studebaker, J. W., W. C. Findley, F. B. Knight, and G. M. Ruch, *Study Arithmetics*, Grade IV. Atlanta: Scott, Foresman and Company, 1948. 344 pp.

Taylor, E. H., *Arithmetic for Teacher Training Classes*. Revised edition; New York: Henry Holt and Company, 1937. 418 pp.

Weber, Rose, Ruth Weber, Flora B. Miller, and Edith H. Price, *Growing Up With Numbers*, Grade I. Atlanta: The McCormick-Mathers Publishing Company, 1942. 96 pp.

B. PERIODICALS

Engen, H. Van, "An Analysis of Meaning in Arithmetic," *The Elementary School Journal*, 49:321-29, February 1949.

Engen, H. Van, "An Analysis of Meaning in Arithmetic," *The Elementary School Journal*, 49:395-400, March,1949.

Koenker, Robert H., "Arithmetic Readiness at the Kindergarten Level," *Journal of Educational Research*, 42:218-23, November 1948.

Trimble, H. C., "Fractions Are Ratios Too," *The Elementary School Journal*, 49:285-91, January 1949.

C. OTHER PUBLICATIONS

Bulletin No. 1, *A Tentative Course of Study for Grades I-XII*. Issued by Gastonia City Schools, Gastonia, North Carolina, 1942. 129 pp.

Bulletin No. 9, Florida State Department of Education, *A Guide to Improved Practice in Florida Elementary Schools*, Curriculum Laboratory, Florida State College for Women, 1940. 308 pp.

Bulletin No. 26, Florida State Department of Education, *Arithmetic in the Elementary School*. Tallahassee: 1944. 77 pp.

Bulletin No. 46, Florida State Department of Education, *A Guide to Teaching in the Primary Grades*. Tallahassee: 1944. 132 pp.

Bulletin No. 1120, University of the State of New York, *Mathematics for Elementary Schools*. Albany: The University Press, 1948. 188 pp.

Circular Series No. 32, _Illinois Curriculum and Course of Study for the Elementary Schools_, 1943. 579 pp.

School Document No. 4, Boston Public Schools, _Course of Study for the Elementary Schools_, Grade I. City of Boston Printing Department, 1936. 138 pp.

School Document No. 5, Boston Public Schools, _Course of Study for the Elementary Schools_, Grade II. City of Boston Printing Department, 1936. 133 pp.

School Document No. 6, Boston Public Schools, _Course of Study for the Elementary Schools_, Grade III. City of Boston Printing Department, 1936. 148 pp.

School Document No. 10, Boston Public Schools, _Course of Study for the Elementary Schools_, Grade IV. City of Boston Printing Department, 1927. 148 pp.

School Document No. 8, Boston Public Schools, _Course of Study for the Elementary Schools_, Grade V. City of Boston Printing Department, 1926. 210 pp.

School Document No. 18, Boston Public Schools, _Course of Study for the Elementary Schools_, Grade VI. City of Boston Printing Department, 1926. 240 pp.

Workshops for Curriculum Study, _Guiding Child Development_, Grades through Six, Hillsborough County Board of Public Instruction. Tampa: 1947. 113 pp.

APPENDIX

PERSONAL QUALIFICATIONS AND DATA SHEET

Name: Harold Mitchell Thompson

Present Address: Clewiston Public Schools, Clewiston, Florida

Permenent Address: Oneco, Florida

Place of Birth: Oneco, Florida

Status: Married

Religious Status: Member of the Methodist Episcopal Church

Professional Objective: Principal of Elementary School

EDUCATION

Undergraduate Level

Attended University of Florida: 1939-40 and 1940-41 General College

Florida Southern College: Spring of 1942, last half of last quarter
Summer 1942
One Year 1942-43
Summer 1943
August 1943 received BS degree with major in mathematics and business administration and minor in science

Graduate Level

Florida Southern College: Summer of 1947 in Lakeland and Guatemala
Community Class Winter of 1947
Community Class 1948-49 term

PROFESSIONAL EXPERIENCE

Assistant football coach and Classroom teacher of mathematics at Bradenton High School (now Manatee County High) during 1946-47 term

Assistant football coach and teacher of American history at Manatee County High School 1947-48 term

Principal of Clewiston Elementary School at Clewiston, Florida, 1948-49 term

OTHER EXPERIENCE

Commissioned at Northwestern University as an Ensign in the Naval Reserve, December 1943

Trained for naval gunfire liaison officer

Assigned to the Staff of the Commander of the Third Amphibious Force with following duties: maintenance officer, executive officer for flag personnel, regulating the duties of enlisted personnel

Length of Service: Active duty 20 months

Assistant manager and bookkeeper, Mitchell Chevrolet Company, Fuquay Springs, North Carolina

Partner in W. B. Thompson and Sons, Oneco, Florida